

What is claimed is:

1 1. A cycloolefin copolymeric (COC) optical
2 communication device, comprising:

3 a core section of functional metallocene
4 cycloolefin copolymer (f-mCOC) having a
5 refractive index n_1 for light
6 transmission; and

7 a cladding layer of metallocene cycloolefin
8 copolymer (mCOC), having a refractive
9 index n_2 smaller than n_1 , surrounding the
10 core section, and forming a waveguide
11 structure together with the core section.

1 2. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 1, wherein the
3 functional metallocene cycloolefin copolymer is
4 synthesized from ethylene, norbornene, and a third
5 monomer having an active site catalyzed by a metallocene
6 catalyst.

1 3. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 2, wherein the
3 third monomer having an active site is 4-methyl-styrene,
4 5-ethyl-2-norbornene or 5-ethylidene-norbornene.

1 4. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 1, wherein the
3 refractive index n_2 of the cladding layer is 1.5200-1.5400
4 while the refractive index n_1 of the core section is

1.5215-1.5631, depending on the requirement of a multi-mode device or a single-mode device.

5. The cycloolefin copolymeric (COC) optical communication device as claimed in claim 1, wherein the metallocene cycloolefin copolymer is synthesized from ethylene and norbornene catalyzed by a metallocene catalyst.

6. The cycloolefin copolymeric (COC) optical communication device as claimed in claim 1, wherein the cycloolefin copolymeric (COC) optical communication device is a multi-mode device, and the refractive-index difference between the core section and the cladding layer $\Delta n (=n_1 - n_2)$ is 0.8%-1.5%.

7. The cycloolefin copolymeric (COC) optical communication device as claimed in claim 1, wherein the cycloolefin copolymeric (COC) optical communication device is a multi-mode device, and the refractive-index difference between the core section and the cladding layer $\Delta n (=n_1 - n_2)$ is 1.0%-1.2%.

8. The cycloolefin copolymeric (COC) optical communication device as claimed in claim 1, wherein the cycloolefin copolymeric (COC) optical communication device is a single-mode device, and the refractive-index difference between the core section and the cladding layer $\Delta n (=n_1 - n_2)$ is 0.1%-0.84%.

9. The cycloolefin copolymeric (COC) optical communication device as claimed in claim 1, wherein the

3 cycloolefin copolymeric (COC) optical communication
4 device is a single-mode device, and the refractive-index
5 difference between the core section and the cladding
6 layer $\Delta n (=n_1-n_2)$ is 0.3%-0.35%.

1 10. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 1, wherein the
3 refractive indices n_1 and n_2 are adjusted by altering the
4 respective components of the core section and the
5 cladding layer.

1 11. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 1, further
3 comprising a U-groove and a packaging mechanics.

1 12. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 11, wherein the
3 U-groove is for passive alignment.

1 14. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 11, wherein the
3 packaging mechanics is a micro lens or a micro lens
4 array.

1 15. The cycloolefin copolymeric (COC) optical
2 communication device as claimed in claim 1, wherein the
3 transmission of the f-mCOC and mCOC to visible light is
4 greater than 90%.